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AUTHOR Blake, Larry J.
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ABSTRACT

After asserting that public institutions should not provide training for nonexistent jobs, this paper reviews problems associated with the accurate prediction of future manpower needs. The paper reviews the processes currently used to project labor force needs and notes the difficulty of accurately forecasting labor market "surprises," such as local plant relocations or shutdowns. The paper argues that "surprise-free" forecasts based on an examination of overall industry trends should be used to project normal manpower needs, while the training requirements brought about by "surprises" need to be handled in a different manner. The techniques used by the Department of Labor (DOL) to calculate manpower projections are then reviewed, their potential sources of error are identified, and recommendations for improvement are made. Next, the North Carolina New and Expanding Industries Program is described, by which the state's community colleges anticipate the "surprise" of new plant openings and subsequently train workers to begin employment there. DOL employment statistics are then cited to refute the myth that advanced computer technology will result in a manpower surplus. Finally, the paper discusses accelerated manpower demands since 1947, the demographic factors that enabled the country to meet the demands, and the flaws in predictions about the impact of computer technology. (JP)

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# PREDICTING AND SUPPLYING HUMAN RESOURCE REQUIREMENTS FOR THE FUTURE

by

Larry J. Blake
President
North Carolina Community College System

American Association of Community and Junior Colleges
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PREDICTING AND SUPPLYING HUMAN RESOURCE
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In attempting to provide an appropriate level, quantity, and quality of occupational training for their communities, states and the nation, community colleges and other training agencies and institutions are in a quandary on all three elements but, particularly, in the quantity required for the present and future.

Most colleges base the quantitative need on either projections of manpower requirements and/or potential student interest. Those who emphasize manpower requirements maintain that individuals want training for employment, not just for the opportunity to compete for employment, while those who emphasize potential interest, claim that everyone has a right to the training they desire regardless of whether jobs exist for everyone who is trained. This paper begins with the premise that manpower requirements ought to be the major, if not the only, basis for quantity of training, that training individuals for jobs that do not exist is unfair to the individual regardless of his or her knowledge of the lack of jobs and is, further, wasteful to the public who foots the bill for individual preference rather than societal requirements. Simplifying the matter to this elementary a level ought to make the determination of the quantity of training required a simple matter, however, that does not take into account the inadequacy of current and proposed methods of determining future manpower requirements.

Currently, manpower requirements are projected nationally by the Department of Labor through a specific process which is conducted in each

state by the Employment Security Agency, which supplies these data on a sub-state regional basis [in the case of North Carolina, 25 regions (18 planning regions and 7 Standard Metropolitan Statistical Areas)]. Other projections are made for specific industries and specific regions; still, most use as a basis for their projections, the Department of Labor projections. The shortcomings of this process will be discussed shortly.

In looking at the process of future projections, one needs to become, at least briefly, a futurist and utilize the techniques involved in this emerging speciality. In describing projections of the future, an eminent futurologist, Herman Kahn of the Hudson Institute of the Future, states that a "surprise-free" future is much easier to forecast than those involving a variety of future "surprises." A surprise-free future can utilize a variety of trend analyses influenced by various reasonably certain future trends, including such elements as: current technology not yet applied, human constraints on change, etc. In this approach, future possible, but not probable, "surprises," such as major depressions, wars and merging technologies, must be taken into account at the time of their occurence to modify future forecasts.

In the field of manpower forecasting, future "surprises" are much more likely to occur on a local basis and less likely on a state or national basis. These would include new industry locations, individual plant shutdowns, etc. The influence of such "surprises" is difficult to forecast and attempting to include them in projections results in less reliability than might be achieved in a "surprise-free" future.

Thus, it is again a premise of this paper that normal manpower forecasts and projections be made on a surprise-free basis and that the training requirements brought about by surprises be handled in a different manner than those of normal projections. A method of handling unusual incidences is already used in North Carolina and several other states and will be described later.

With this as a basis, the preponderance of training, which is based upon normal business and industrial growth and employment turnover, can be addressed individually. Although the Department of Labor process should be used for projections, first, the reliability of such projections must be analyzed.

Human Resource Requirement Projections

Since a vast majority of manpower projections are based upon the data provided by the Department of Labor, the process used therein should be analyzed for its reliability. In simple terms, this process has four separate elements, namely: total employment by industry, proportion by occupation, expansion requirements, and replacement requirements.

Total employment by industry is taken from the data of unemployment insurance and has a history of high reliability.

Proportion by occupation within a given industry is based either upon census data or Employment Security Agency survey data. The former is based upon individual response which generally results in inaccurate definition of occupation and is also based upon a 10-year cycle. Recognizing the limitations of this system, it is not relied upon too heavily. It is in

the surveys where major potential sources of error can be found. This system uses a sampling process involving firms with over 100 employees on a three-year cycle basis. Sources of error in this system result from the limitation to firms with over 100 employees (in the state of North Carolina, 95 percent of employers have fewer than 50 employees), a bias introduced by utilizing responses only, and the potential static nature of the three-year cycle.

In determining expansion requirements, a trend extrapolation process is used with a fairly high degree of reliability but one which some critics feel does not adequately recognize emerging trends.

It is in the last portion of the process, that of determining replacement requirements, that the largest potential source of error, one of underprojection, can be found. In determing replacements, labor force separations due to deaths, retirements, disablement, etc., of the census data are used. This does not account for labor force separations due to changes in occupation (generally requiring retraining); separation to school, home, and leisure; promotion to supervisory ranks or advanced positions, nor influences of the mobility of the American population. Even the influence of continuous unfilled positions is not adequately considered in this process resulting, in the most cases, in light to severe underprojection.

The potential lack of reliability of manpower projections, based upon this type of system, seriously hampers community colleges and other training institutions in adequately fulfilling the human resource requirements of the future. This, still, ought not to lead one to write

off the system and start from scratch with a new and, hopefully, more reliable one. There are many strengths in the Department of Labor projection process and, if a way were found to overcome its weaknesses, determination of the quantity question should be greatly simplified. Two possible modifications are proposed herein.

In order to overcome the potentially greater source of error, that of inadequate replacement requirements, a suggestion is made to base this requirement upon a trend of extrapolation of actual employment turnover, quantifying the number of individuals actually hired in a given job classification each year less those who are merely changing companies without the requirement of additional training. The result should give a fairly reliable figure of the actual training requirements within that given job classification.

Further, these projections, and possibly those of expansion requirements, could be subjected to an analysis by a panel of business and industry specialists within a given industry as to what influences potential future trends might have on the trend of employment, whether it is expected to remain steady, increase, or decrease based upon their expert knowledge.

Supplying Human Resource Requirements

Given reliable projections of human resource requirements within given job classifications, community colleges and other training institutions could feel fairly comfortable using such projections to determine the training required in a "surprise-free" future.

In reacting to the surprises of the future, the North Carolina New and Expanding Industries Program, which has existed for over 20 years and has been duplicated and/or modified in several other states, is a possible model. In this model, the Department of Community Colleges works very closely with business and industry, the North Carolina Department of Commerce, and the North Carolina Industrial Developers Association to determine as far in advance as possible actual decisions to locate a new industry in a given area or to rapidly expand an existing industry. With this knowledge, the Community College System can guarantee to that industry that, as it is building its new facility, the System will be training the initial cadre of workers required, at little or no cost to the industry, and will deliver to its doorstep those workers when production begins. In this way, North Carolina community colleges have trained over 132,000 workers for new and expanding industries in the state in over 1,300 projects for over 1,000 different industries from plastics and auto parts to pharmaceuticals and electronics. During the past four years of Governor James B. Hunt, Jr.'s administration alone, industry has committed to a future $8.2 billion of new facilities, creating over 122,000 new jobs. The Community College System is confident that, using the new and expanding industries model, it will continue to meet the needs of the state in this surprise-type future.

The Impending Manpower Surplus: A Myth

Looking ahead a decade or two, some manpower planners are renewing a myth of the 1950's: that automation and technological changes

will create a serious oversupply of manpower. An often-quoted popular forecast made during the 1950's and 1960's predicted that by the turn of the century, 10 percent of the total population would do the meaningful work for society. This projection was based upon reliable (and, subsequently, fulfilled) projections of the impact of automation and computers in reducing the requirements for workers in routine, repetitive, often strenuous, jobs in the factory and in the office.

Serious papers, conferences, and books were developed concerning the future of work in the work place. Not only were these concerned with the changing nature of work in the work place, but also with alarm about what 90 percent of the population would do if 10 percent would be able to do the meaningful work, given traditional human values about the work ethic.

Many at that time predicted that activities, such as those involving traditional charitable and leisure activities, would become paid jobs in the future, thus, expanding the definition of "meaningful" work. Indeed, this has happened to a minor extent. In the human services, arts, and recreation, paid employment has expanded rapidly in such areas as welfare, child care, geriatrics, parole, visiting artists, public symphonies, parks and recreation.

Still, history has shown the projected reduction in total manpower demand in the United States to be completely in error, in fact, just the opposite has occurred. Instead of turning downward over the past 30 years (1947-77), the total labor force of the United States has been accelerating.

Instead of worrying about what "unemployed" populations would do, had the forecasters been aware of the trend, they would have been concerned from whence the additional labor force would come.

It is the thesis of this paper that the additional labor force came as a result of three phenomena, namely, the automation of agriculture and the reduction in the requirements for farm labor, the increased participation of women in the labor force, and the coming of age of the post-World War II baby boom.

According to U.S. Department of Labor statistics, from 1947 to 1977, the percent of the non-institutionalized total population age 16 and over (this category will subsequently be referred to as "total population") involved in agriculture dropped from 12.9 percent to 3.3 percent in the United States. Had the percentage remained constant a 12.9 percent, an additional 9.6 million people would be required in agriculture. Thus, farm automation and other influences which reduce the percentage of population required in agriculture have freed this population for work in other areas.

For a variety of reasons, women have continued to participate in the labor force at an increasing percentage during this 30-year period. In 1947, the percent of the total female population participating in the work force was 31.8 percent, and in 1977, it was 48.9 percent (in 1980, it is estimated at 52 percent). Had the percentage of women participating in the labor force remained at a constant 31.8 percent, there would be 13.8 million fewer women working today than actually are.

A final major effect on the total supply of input to the labor force has been the increased population due to the influences of the post-World War II baby boom. The influences of this boom rapidly expanded the elementary and secondary school populations in the 1960's and higher education in the 1970's. Currently, the cycle of reduced births in the 1960's contributed to reduced elementary and secondary populations in the 1970's and to projected reductions in post-secondary enrollments during the 1980's. Current estimates show that the 18-year old population in the United States will drop by 23 percent from 1979 to 1992.

Based upon statistics concerning the increase in the 18-year old population from 1947 to 1977, an estimated 22.8 million additional individuals were added to the labor force over that 30-year period.

Looking to the future, it cannot be anticipated that the current percentage of the total population employed in agriculture can be reduced significantly if at all. Also, it cannot be anticipated that a significant new supply of labor force can be obtained by increased participation of women in the work force, rather, one could expect this to decelerate and stabilize at around 60 percent. Finally, increases in the labor force due to the influx of 18 year-olds is certainly not expected to continue, is not expected to stabilize, but can certainly be depended upon to decrease inasmuch as future 18-year olds are already with us and can be reliably counted.

From our experience in the past two decades, it can be seen that the expected drastic drop in the labor demand as anticipated through the influences of automation and computers did not happen and probably will not happen to any significant extent in the future.

What Happened?

What went wrong with the predicted influences of automation and computers? Did not these two influences release American workers from routine, monotonous, drudgery jobs? With the experience gained during the past 30 years, we can now explain both the fulfillment of the promise of automation and technology and its influence upon work and the work place as well as the unfulfillment of the prediction.

Automation, computers, and other technology have more than fulfilled their promise of eliminating routine jobs such as manually adding columns of figures, counting inventories, digging ditches, and many other such jobs in the office, construction and the factory. To the point, a statement made by a California banker, in 1970, estimated that had not the computer been invented, it would have taken the entire population of the State of California to do the banking for that same population. Considerable statistical evidence is available documenting the elimination of jobs by automation and computers.

A number of factors contribute to nonrealization of the prediction of drastically reduced labor demand. A major factor was the large number and variety of new occupations generated by that very technology, jobs which did not exist in the past. Also, not only anticipated was the continued shift from primary to secondary to tertiary industries with a

resultant explosive growth in the service industry sector. Another major factor has been the immergence of the post-industrial society, or the communications revolution as it is often termed, with its requirement of a large variety of new occupations.

What About the Future?

We are now witnessing the beginnings of another major cycle in the applications of technology through the expanding use of microelectronics, sophisticated robotry, the marriage of the computer and television, and the rapidly expanding telecommunications field. As the transistor heralded the first predictions of the impact of technology upon the work place, the integrated circuit with its miniaturization through Large Scale Integration (LSI) and Very Large Scale Integration (VLSI) are making possible a second major cycle.

The significance of the past thirty years would lead one to believe that, similarly, new jobs will be created keeping the labor demand at the current rate or with only a minimal reduction. Assuming a fair degree of reliability for this major thesis, we can expect a significant short fall in the labor supply as compared to demand into the future. Still, utilizing reliable dynamic manpower projection techniques, the changing requirements can be estimated.

Summary

It may appear that, through the reading of this paper, the author has solid and reliable recommendations for fully meeting the human resource requirements of the future. To the contrary, this paper was developed

only as a thought-provoking analysis of a critical problem facing community colleges and other training institutions and one wh ch, hopefully, will start the best minds to thinking about it. With adequate projections, attention can be given to sources of labor supply, appropriate training and education, and then we can focus upon the other issues of level and quality.

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